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Characteristics of Step-Recovery-Diode Frequency Multipliers

Three published reports describe an investigation into the uses of step-recovery diodes (SRD's) for controlling the phase of microwave phased-array antennas.

The main objective of the initial investigation phase was to develop the necessary circuitry for using the fast current-switching capabilities of SRD's in frequency multiplication, particularly in one-stage multiplication from the VHF band (100 to 200 MHz) to the S-band (2200 MHz). An overriding consideration was the need for developing a theory of operation for the SRD frequency multiplier. Such a theory would enable the systematic design of circuits which would make the best use of commercially available SRD's and would have predetermined circuit characteristics.

The second phase of the investigation was directed toward studying and experimentally investigating the design of solid-state X-band transmitters employing SRD multipliers. A transmitter was built and two approaches were investigated; the one employing two multipliers was subsequently selected as the better of the two.

The last phase included work on a 36-element (6-by-6) phased-array receiving antenna using SRD frequency multipliers. The purpose of this receiver was to demonstrate the scanability of a planar array by controlling the bias applied to an SRD multiplier-local oscillator in the receiving elements.

Note:

Requests for further information may be directed to:

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